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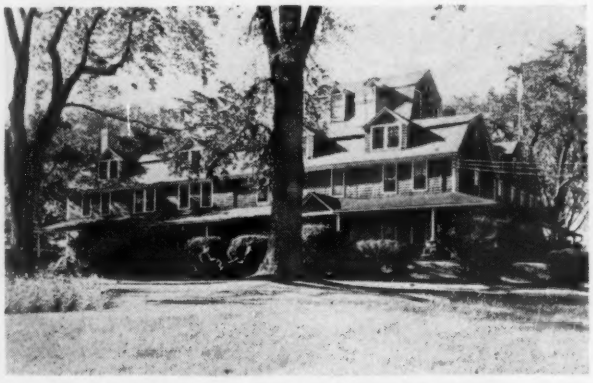

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DISEASES of the NERVOUS SYSTEM

(PUBLISHED MONTHLY)

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

White Men in the Tropics*

JAMES L. McCARTNEY, COMDR. (MC) USNR
New York, New York

Vast armies of white men are being transported to climates for which they are inherently not fitted. Many of them fall prey to the ravages of disease, physical, mental or both. In a previous paper I discussed the neuropsychiatric sequelae that may follow in the tropics,[1] and since that report there has been further opportunity to study a number of cases invalided back to the U. S. Naval Hospital at Brooklyn, New York.

It is a well-known fact that tropical diseases frequently show neurologic sequelae, although these degenerative changes have not always been recorded by the authorities. Personality changes of functional nature following residence in the tropics have been accepted with little comment and without adequate explanation. It was an accepted conclusion that a person who went to the tropics must have been "queer" to begin with. Now, however, thousands, perhaps millions of "normal" men are being sent to the tropics. Will they come home "queer," permanently disabled, a result not of their own misconduct but incurred in line of duty?

Research made some years ago among American missionaries, the majority of whom had been in tropical countries, showed that 36.7 per cent were furloughed home because of neuropsychiatric problems.[2] These well-educated individuals above average intelligence broke under foreign environment. Many showed physical pathology, but most only functional changes.

True, these missionaries were generally of the emotional type, fired with the zeal of their calling, but so also are most of our officers and enlisted personnel. Authorities agree that long residence in tropical countries causes definite personality changes. These changes are insidious and may be due to the foreign social environment or may be due to physiological influences. How long must the residence be to be harmful? Even a brief stay in the tropics may be sufficient to aggravate a hidden predisposition which "existed prior to enlistment."

American business firms have fully realized that the white man cannot live in the tropics indefinitely and consequently arrange annual vacations during the hot summer months and extended leaves to America at least every three years to regain proper perspective. Missionary societies also furlough their members more often than in former years. Our military forces, prior to the present hostilities were being given shorter and shorter tours of duty in the tropics. In the Philippines there is continuous heat with no winter which is also true of Panama, Central America, North Africa, and the southern peninsula of India, where white men do not last long even if they escape infections. During a twelve-month period prior to the Japanese capture of Cavite, eight naval officers were sent home disabled by "tropical neurasthenia."[3] For the British, before the war, the tour of duty in the hot stations, such as Aden, was twelve months, because it was found cheaper to furlough the men each year than keep them longer. The French tour of duty in the worst parts of

*Released for publication by the Division of Publication of the Bureau of Medicine and Surgery of the United States Navy.

Africa was twenty months. We are now fighting a war, and it may be necessary to leave our men in the humid heat of the tropics for extended periods.

Johnson and Martin[4] state that "when the barometer is high, we feel vigorous and cheerful; when it sinks, languour and low spirits oppress us. We experience an extreme oppression of the nervous energy, and consequent muscular lassitude, with disinclination to active exertion of mind or body, the body seems more bulky and feels heavier to the individual; the hair looks dank and greasy, while the scalp is covered with furfuraceous eruption, and exudes an unpleasant acid odour."

Volumes have been written on climate and disease, and in most works on tropical hygiene we find discussions on acclimatization;[5,6] i.e., advising newcomers to restrict their activities until they become acclimated. On the other hand, Manson[7] points out that there are numerous facts emphasizing that the longer a white man resides in the tropics the more he is subject to certain diseases, and there appears to be an actual increase in susceptibility. Rogers and Megaw[6] point out that "In very hot weather, especially when the high air temperature is accompanied by excessive air moisture and lack of movement of the air, the body has to contend against unfavourable conditions. The appetite is naturally feeble and exercise is almost impossible. There is loss of resistance to disease. Mental energy is sapped, and individuals cease to make any effort."

Residence in the tropics sooner or later causes a reduction in blood pressure and basal metabolism in an appreciable number of persons. This tendency has been studied by numerous physicians[7,8,9,10] and although it is concluded that hypotension does not result in every case, nor that persons with hypertension are appreciably affected, nevertheless Roddis and Cooper[11] found that persons in the tropics had a blood pressure 10 to 15 mm. Hg. below the normal of temperate zones. Cadbury[12] after extensive studies on this subject stated that the hypotension in uncomplicated cases was caused by the constant dilatation of the peripheral blood vessels, the increased secretory function of the skin, the splanchnic effects, the vasoconstriction of the superficial vessels, and the variations in the volume and viscosity of the blood. Rogers and Megaw,[6] Riemerschmid,[13] Robinson, Dill, Wilson and Nielsen[14] agree that the heat is the greatest factor, as the rays of the sun do not penetrate sufficiently deep to cause massive changes except in light stroke. They point out that prolonged heat causes cramps, giddiness, faintness and all the symptoms of shock, and is followed by persistent hypotension and neurological sequelae. In heat fever which results from the powerful heating effect of the tropical sun on the body, the heat-regulating mechanism becomes overtaxed and fails to keep the body below the temperature at which damage is done to the body cells, especially to the nerve cells. This is verified by the use of hyperthermia.

Under tropical heat, even at rest, at least one pint of liquid is evaporated from the body hourly with the loss of chlorides and vitamins. Tests were conducted on a company of Marines hiking seven miles with a dry and wet bulb reading 79° F. and 67° F. and the men were found to lose an average of three pints of liquid.[15] There is hyperemia of all body tissues; petechial hemorrhages frequently occur; there is congestion and edema of the meninges; and it has been found that the myelin of the nerve cells and nerve fibrils will liquefy at high temperatures.

In the annual maneuvers of a Marine Corps unit at Quantico, Virginia, ten per cent of the unit were incapacitated because of heat exhaustion. On July 8, 1853, two-thirds of a Belgian regiment in the tropics were prostrated by the heat while on a march. In 1878, one Austrian regiment had 320 cases and 31 deaths from heat exhaustion. In one French division in Africa over two thousand cases of heat prostration occurred. In northern China, during the Boxer Uprising, a regiment of 1,200 American soldiers made a forced march on Pekin, and one-fourth of its men were temporarily disabled from heat, and eight died.

On the other hand, the sun's rays alone may cause damage to the tissues. There are many reports in the literature that heliotherapy may cause a marked fall in blood pressure and even cause shock. Sunlight may irreversibly damage the retina, and temporary or permanent blindness of parts of the retina may result from light stroke, and headache always results.

Over-stimulation by bright light for any

length of time may cause night blindness. Night blindness is a neuropsychiatric problem of military import,[16] because the person suffering from this condition may have perfectly normal vision during the day, and be useless as an observer after the sun goes down. Tragic collisions have frequently resulted because the navigation officer on the bridge was night blind, although he could see perfectly during the day. A naval officer who had been overexposed to tropical sunlight did not realize that he had become night blind and as a result directed his ship into three collisions before his disability was discovered. All wave lengths between 200 and 2,000 microns are liable to cause cell irritation. Contractions of the rods can be obtained by any length between 226 and 800. Of course, the retinal damage is invariably worse when other constitutional factors are present, such as alcoholism, diet deficiencies, and reduced vitality from whatever cause. Liljencrantz[17] emphasized that even temporary exposure to intense light may interfere with the adjustment to night vision. Nystagmus and corneal astigmatism are frequent results of continued exposure to intense light.

The sun's rays are known to have a marked chemical effect on the body tissues, as witnessed by the absorption of vitamin D, and the adverse effect of the sun on persons taking the sulfa drugs. Vitamins have been extensively employed by the various belligerents in this war. Vitamin C or ascorbic acid is destroyed by infection and a number of industrial poisons,[18] and is lost in appreciable quantities in heavy perspiration. The health of intracellular tissue depends in part upon an adequate level of this vitamin. It has been found effective in promoting the healing of fractures and wounds, and in combating shock and hay fever. Also, Vitamin B is markedly depleted by both excessive sweating and infection, and is destroyed by sunshine and alcohol.

King[19] states that the climate of the West Indies has the same effect in causing neurasthenia among white people as do the tropics in general. This psychoneurosis has been explained by various writers on a physical as well as psychogenic basis. Woodruff[6] says "tropical irritability is mostly due to the constant bombardment of the sun, for it is worse in blonds," while in the study previously referred to[2] it was felt that sociological factors are undoubtedly of prime importance in causing these situational psychoneuroses.

The white man arriving in tropical countries for the first time finds a milieu totally different than the American environment. Moral standards are lower, human values are negligible, and intemperances of every kind are the order of the day. Johnson and Martin[4] say, "licentious indulgences which are but too easily procured, and too frequently practiced in all tropical climates." This unmoral environment is too much for the white man when he finds it constantly about him. Sexual promiscuity[20] is common, and as a result, psychic conflicts and guilt feelings are set up in the white man's conscience. He either submits, becomes calloused or develops a psychoneurosis, or even a psychosis.

Newcomers in the tropics experience a great stimulation of the sexual system, and this seems to be followed by exhaustion as it leads to excesses. There is ample evidence in temperate zones that the sexual system is particularly stimulated with the return of spring sunshine, and this is not entirely psychogenic. Among the Eskimo this spring stimulation amounts to a rutting season.[6] Sunlight applied directly to the gonads has a marked stimulating effect, which if continued may lead to a depressive effect. This is also true of the thyroid gland, and if over stimulated, a hypothyroidism may develop through exhaustion or toxic changes.[10] There is no doubt that in the tropics as elsewhere, sexual excesses may lead to physiologic exhaustion, but in most cases the psychogenic factors are the more serious.

Sexual activity colors the whole picture of tropical neurasthenia. The patient feels that sexual indulgence may be causing his symptoms, but he keeps it up and not only reproaches himself but wonders what the outcome of his self-gratification will be. This is frequently followed by nocturnal emissions, premature ejaculations and impotency. He suffers from insomnia, becomes easily exhausted, is pessimistic, becomes irritable and gloomy, has frequent headaches especially in the occipital region, complains of pressure sensations on top of the head, pain along the spine, tinnitus and his eyes tire easily when reading. Reflexes are exaggerated and blood pressure is usually low.

Because these individuals soon find that drinking alcoholic beverages improve their symptoms, they over-indulge in these stimulants. The cerebral depressive effect of alcohol allows them to escape from unpleasant psychoneurotic ideology and consequently they indulge. Indulgence breeds overindulgence, and as a result white men in the tropics tend to become chronic alcoholics.

Chronic alcoholism leads to chronic congestion of the brain tissue and multiple neuritis. This condition is aggravated by hot weather, and obviously would be worse in the tropics.[21] Therefore Korsakoff's syndrome and delirium tremens are more frequently found in alcoholics in the tropics than in temperate climates. These cases are disorientated as to time and place although orientated as to persons. They develop hallucinations of sight, have marked insomnia, and since they may have a fever, an intercurrent infection may be suspected. There is usually pain over the course of the affected nerve, lessened muscular power, more or less atrophy of the muscles, and trophic changes in the skin. The reflexes, deep and superficial, may be diminished or absent.

Johnson and Martin[4] give a report on this condition as they observed it in the British forces in the tropics:

"In young soldiers, we find that occasional course of drinking, with isolation, will produce great excitement of both nervous and vascular functions, amounting in some cases to maniacal fury, the strangest illusions, violence and hurry of manner, with incessant muttering and general irritability, the face being flushed, and the head hot. There is great anxiety, with oppression of the precordia, vomiting, spasmodic pains, and occasional headache, the urinary and intestinal excretions being scanty and depraved, the tongue foul and tremulous.

"In the older soldier, habituated to the abuse of intoxicating liquors, every debilitating cause, frequently even the withdrawal of the accustomed bane, is followed by collapse of the vital powers, as indicated by nervous depression, etc. The manner, though wild, is more subdued, and the temper melancholy, the mind being in a perpetual anguish, continually haunted with imaginary alarms and illusions.

"There can be no doubt that a protracted residence in the tropics, along with habitual tippling and tobacco-smoking, form together by far the most general cause of the more acute forms of delirium tremens."

Rogers and Megaw[6] emphasize that "alcoholic excess is responsible for more disability among Europeans in the tropics than any of the tropical diseases."

The use of alcoholics and the natural limitation of diet because of it, or because of the fear of intestinal infections frequently leads to vitamin deficiencies among white people in the tropics. The lack of vitamin A is indeed common and may lead to xerophthalmia and night blindness, which may be precipitated by exposure to the sun's rays as previously mentioned. In these cases there is frequently neuritis, wasting of the muscles, itching of the skin and anemia. Vitamin B and C are essential in the detoxifying metabolism of the body,[22] and yet they are seldom adequate in the tropical diet. They are especially important in the tropics where toxic substances are so commonly found in the body, either from endogenous or exogenous sources.[23]

No doubt medical officers on the war fronts are recording their findings as time allows, and it is hoped that in due course these gleanings will be correlated. Even though our expeditionary forces have just begun to roll, we have already encountered a number of patients who prove an enigma to the diagnostician. A study of these cases emphasizes the importance of fully realizing that the average white man is not geared to the tropics.

Cases

1) J. J. C.—Diagnosis, psychosis, intoxication (alcohol), sent in with the diagnosis of dementia praecox, but when he returned from Cuba he was symptom free. He had been very depressed, discouraged, restless, complaining of frequent headaches and insomnia. He showed a blood pressure of 106/80 after having been exposed to summer sun for two months. He had been drinking excessively and had been given a course of sulfa drugs for a specific infection. Blond, showing no physical defect, he was returned to duty.

2) J. M. H. M.—Diagnosis, psychosis, intoxication (sulfathiazole), sent in with the diagnosis of dementia praecox, but when he arrived from Panama he was symptom free. He had had auditory hallucinations, insomnia,

tremors, increased reflexes, and felt he was going "crazy." Showed a blood pressure of 122/88, headaches, after being under the tropical sun for four months. He was given sulfathiazole for three months for a specific infection. An occasional drinker, blond, showing no physical defect. Returned to duty.

3) R. K.—Diagnosis, psychosis, intoxication (alcohol), sent in with the diagnosis of psychosis (unclassified), but symptoms cleared shortly after arrival in U. S. A. He had auditory and visual hallucinations, fainting spells, was suicidal and complained of headaches. Had been drinking regularly while in Cuba, and was daily exposed to the sun. Blond, showing no physical defect. Returned to duty.

4) F. E. J.—Diagnosis, psychoneurosis, and was admitted with the diagnosis of dementia praecox. Had been in tropics six months. Suffered from bowel trouble, was hysterical, had dizzy spells and frequent headaches. Had a blood pressure 130/70. Blond, with no physical defects, but was considered unfit for service and so surveyed.

5) W. D. S.—Diagnosis, no disease. He was admitted for mental observation because he had a heavy feeling in his head. He had been in the tropics ten months, drank heavily, and stood guard regularly in the sun. Blond, with no physical defects except tremors of the hands. One month in the hospital and he was returned to duty.

6) J. R. M.—Diagnosis, heat exhaustion, and was admitted with the diagnosis undetermined. Had had a period of 11 months of amnesia following a head injury two years prior to enlistment. He was in tropics one month, when he complained of headaches, was depressed, became delirious, and had recurrent amnesia. Blond, with a blood pressure 110/62, slight build. Five months after hospitalization was symptom free but was surveyed out of service.

7) D. P. L.—Diagnosis, psychoneurosis. He was admitted for mental observation because he complained of extreme nervousness, tremors, intolerance to hot weather, sweaty hands and occasional diarrhea. He had 13 years service, with seven years in the tropics. He contracted syphilis from a Chinese woman in China in 1935 and was under constant treatment. He showed a 4+ spinal fluid until he had treatment by malaria in November, 1936. Since then serology has been negative. He is a blond, blood pressure 116/74, and B. M. R. +14. Returned to duty.

8) F. P. E.—Diagnosis, amnesia. Three months after enlistment suffered from a period of amnesia, which was preceded by easy fatigability, periodic headaches and scarey dreams, which came on a month after duty in West Indies. He had had eight periods of amnesia prior to enlistment and had had a head injury as a child. He was a blond, blood pressure 122/82, and showed a positive Romberg, past-pointing, tremors, slow reactions, poor coordination and nystagmus. He was surveyed out of service.

9) A. L. B.—Diagnosis, psychoneurosis. He was admitted with the diagnosis of dementia praecox, as he began to show paranoid ideas, headaches and precordial pains ten months after going to Panama. He gave a history of moderate drinking but regular guard duty in the sun. He was a blond, blood pressure 124/80, but showing no physical pathology. He was returned to duty.

10) A. L. K.—Diagnosis, no disease. He was admitted with the diagnosis dementia praecox because he lost interest in his work. He was depressed and confused, and had insomnia. He was sent to Puerto Rico three months after enlistment and began to show symptoms five months after duty in the West Indies. He was a moderate drinker. He was a blond, blood pressure 112/68, and showed increased reflexes. He was returned to duty as his symptoms completely cleared up after six weeks in the hospital.

11) R. A. B.—Diagnosis, psychoneurosis (neurasthenia). He was admitted for mental observation because he had complained of constant headaches and nervousness six weeks after being sent to the West Indies. On admission he was much depressed, was easily reduced to tears, appeared in constant anxiety and showed increased reflexes and tremors of the hands. He was blond, had a blood pressure 120/80, and suffered from insomnia. He stated that the sun hurt his eyes, and he did not drink because even one glass of beer made him dizzy. He showed only slight improvement after two months in the hospital here, and was surveyed out of service.

12) L. G. B.—Diagnosis, psychoneurosis (situational). Was sent in for mental observation because after six months in the Caribbean he attempted to commit suicide by

slashing his wrists. He had constant headache since being exposed to tropical sun, drank heavily, and was sexually overactive followed by impotency. Blond with a blood pressure 110/80. Was surveyed from the service.

Summary and Conclusion

The human body under physical stress, and even at rest, generates heat which is utilized or dissipated by radiation or the cooling effect of the evaporation of sweat. If the temperature of the environment is higher than the body, as it often is in the tropics, no radiation from the body can take place. The body therefore must rely upon sweating as its cooling device, but if not properly controlled, the body may have its salts and vitamins depleted by sweating.

Exposure to the high temperatures of the tropics, particularly when associated with high humidity, may result in a variety of indefinite subjective symptoms. These symptoms may lead to erroneous diagnosis.

There is great individual variation in response to heat and sunlight. The blond appears to be definitely more susceptible than the dark complexional individual.

Persons who have once suffered even a mild attack of heat exhaustion or sunstroke may show an increased susceptibility for many years thereafter. These individuals are unfit for residence in tropical climates.

There is ample evidence to lead to the conclusion that conditions in the tropics tend to establish a symptom complex that is apt to be diagnosed as psychoneurosis. In schizoid individuals these symptoms may mistakenly lead to the diagnosis of dementia praecox. It is therefore advisable that patients furloughed back to America be given the label "diagnosis undetermined," rather than a definite diagnosis.

The medical offcer needs to carefully study the environmental factors, and to properly warn the personnel against excesses of every kind. Alcohol appears to have undue effect on physiological and psychological processes when associated with the tropical environment. Chronic alcoholism makes insidious inroads on the personality, and sexual promiscuity is an ever-present hazard in the tropics.

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Cicatricial Occlusion of the Aqueduct: Treatment by Insertion of a Rubber Catheter

(Report of a Case)

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Several attempts to insert a rubber catheter into the sylvian aqueduct have been reported in the literature. In no case did the patient survive, although one of Dandy's two cases[1] lived following removal of the tube. In this case the tube was of quite large calibre and seemed to lie anterior to the normal position of the aqueduct, so that probably it caused displacement of the brain stem or else had found a new bed for itself anterior to the normal course of the aqueduct. In any event, temperature, vomiting and lethargy necessitated its removal in the second week. Rivarola[2] described a similar experience. Torkildsen's work[3] and its confirmation by White,[4] Penfield[5] and others would indicate that the sylvian aqueduct probably would tolerate a rubber catheter if the reaction were no different from that of the occipital region of the brain.

We wish to report a case of cicatricial stenosis of the aqueduct in which a rubber catheter placed past the point of obstruction has relieved the symptoms and caused no reaction for a period of fifteen months. The procedure which consists of turning down a flap across the torcular Herophili and splitting the superior medullary velum allows excellent exposure of the region and visualization of the point of obstruction to the aqueduct.

This report is unusual in only two points: first in the successful use of the catheter in the aqueduct to keep the point of constriction open, and second in the method of exposure which allows complete exploration of the superior cerebellum and lower occipital region (the region overlying the aqueduct).

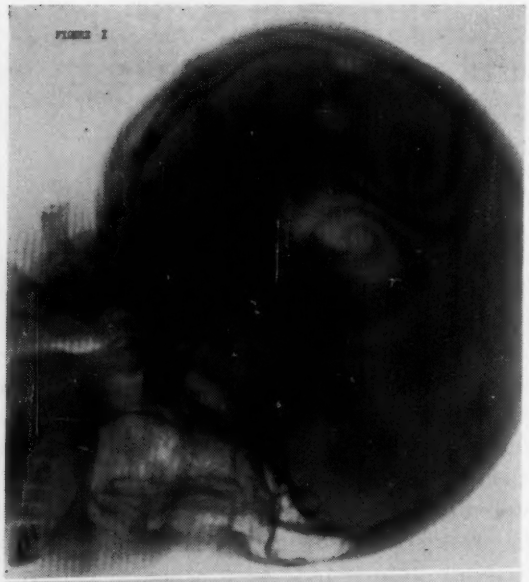
Case Report

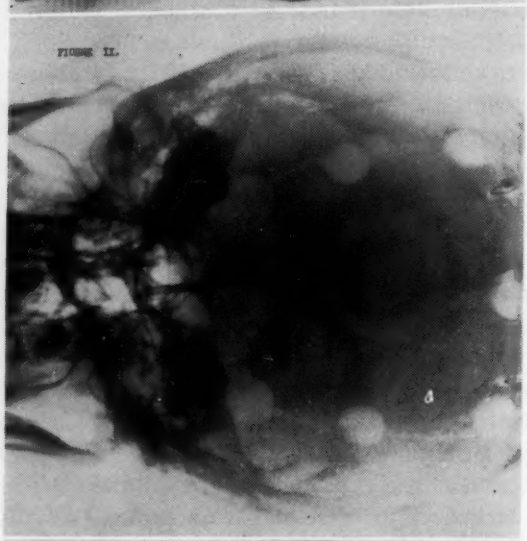
Mrs. A. M. B., age 52, was first seen on Nov. 10, 1941, at which time her family stated that she had had headache and double vision for about five weeks. She had also been confused and "talked out of her head" most of the time.

The neurological examination revealed a complete paralysis of upward gaze and a choked disc of two diopters with hemorrhages on the right and an early choking on the left. There was no paralysis but there was a marked ataxia of the trunk muscles so that she had great difficulty in rising to a sitting position and there was a continual tendency to fall over backward (superior cerebellar lesion). She could not stand or walk without support. All reflexes were normal and no sensory changes were found. Mentally she was completely confused and disoriented.

A ventriculogram on November 14 showed a dilated ventricular system (Fig. 1) with no filling of the fourth ventricle. It was felt that she probably had a pineal tumor, a tumor of the superior cerebellum or possibly both. Since we had repeatedly turned down flaps across both the sagittal and transverse sinuses, we felt that a flap across the torcular would be safe and would give the best exposure to both supra and infratentorial regions. One can see from the P. A. view of the x-ray taken (Fig. 2) that burr openings were actually placed over the sinuses so that they could be watched and damage from passage of the saw carrier averted. The bone flap was broken off just above the foramen magnum and the remainder of bone down to the foramen removed. After relieving the pressure by tapping the lateral ventricle, the dura was opened above the tentorium near the midline on the right and after coagulating several large veins, a lighted retractor was introduced down to the corpus callosum. This appeared so normal that it was not incised and the dura was opened below the transverse sinuses by a high transverse incision after coagulating the occipital sinus. Exploration of the superior cerebellum was then easily accomplished by gently retracting the transverse sinuses upwards. The anterior border of the tentorium seemed to be free and there was no pressure against it. The lower cerebellum was then exposed by an incision in the dura close to the midline.

The vermis was split and the fourth ven-





tricle opened. A small catheter was passed up the aqueduct and a definite point of block was located about one-half inch above the fourth ventricle. The upper vermis was then split including the anterior medullary velum and the lower portion of the aqueduct actually opened to the point of block. A fine pair of forceps was introduced here with the blades closed and at a depth of less than one-eighth inch the fluid poured out. Opening the constriction allowed the fluid to escape. On removal of the forceps, the flow of fluid stopped again. The point of obstruction seemed to be a glial change with interruption of the smooth ependymal lining. There was no suggestion of tumor. It was quite easy to pass the rubber catheter on into the third ventricle.

Following this, it was demonstrated that saline solution introduced into the lateral ventricle escaped freely from the catheter. The catheter was then cut off at proper length so that its end lay in the spinal subarachnoid space. The arachnoid was partially closed over it with two fine silk sutures and the tube anchored to the dura with a heavy double silk suture.

The dura was then closed and the bone flap wired above. Only two wire loops were used due to the shape of the flap; muscle contraction served to lock the bone more tightly in place. Muscles along the lateral border of the flap were closed in layers.

The whole procedure took approximately six hours, under novocaine anesthesia, and while the condition of the patient seemed fairly poor at the beginning she seemed little worse at the termination of the procedure. (BP 120 over 70 and pulse 88.) Except for a twelve-hour rise of temperature to 103° F., she improved almost from the beginning. She was discharged on the 17th postoperative day at which time it was noted that the choked discs had nearly subsided and she was able to sit up. She had a little internal strabismus of the right eye.

Six weeks after the operation she was able to walk with a little help, was mentally clear and the optic nerves were normal. She no

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Figure I: Ventriculogram—moderate hydrocephalus.

Figure II: P. A. view—tube through aqueduct.

Figure III: Tube extending from third ventricle through aqueduct to spinal subarachnoid space.

longer complained of headache. The right eye could be turned upward but not the left. There was still a little weakness of the right lateral rectus.

The patient then returned home and was not seen again as she lived at a distance of 400 miles but several letters indicated some slight further improvement. The last letter, fifteen months postoperative, stated that she still had some difficulty with double vision and needed assistance in walking but was otherwise well.

Comment

The period of fifteen months would indicate fair tolerance of the periaqueductal tissues to the rubber catheter and the procedure has been successful in relieving the hydrocephalus incident to the cicatricial occlusion. X-rays show the hypdrocephalus and the rubber catheter in place (Fig. 3). These two plates when superimposed show that the catheter goes into the center of the third ventricle and conforms to the gradual curve of the aqueduct.

While tumor is not ruled out, the absence of additional symptoms would be against it after this length of time. It is believed that the symptoms referable to the quadrigeminal plate could be explained by the large suprapineal recess of the third ventricle.

This procedure is more difficult than that of Torkildsen but allows good exposure and visualization of the pathology which occludes the aqueduct. It would not be recommended where there is a definite tumor blocking the aqueduct.

Conclusions

A new surgical approach for relief of cicatricial occlusion of the aqueduct is described. The unusual features are:

1) The use of an osteoplastic flap thrown down across the torcular which allows exposure of the superior vermis overlying the aqueduct.

2) The insertion of a rubber catheter in the aqueduct.

A case is reported in which relief has been obtained for fifteen months following this procedure, the catheter, of course, remaining in the aqueduct.

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The Psychogenesis of Raynaud's Syndrome*

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For more than seventy years the term Raynaud's disease has been used to describe a syndrome involving the blood vessels supplying certain parts of the body. The most common manifestations of this symptom complex are pain, cyanosis, pallor, hypasthesia and even gangrene of the hands, feet, nose or ears. The hands are the most frequently involved area. Involvement of the feet without the hands is very rare and, if present, the diagnosis is usually questionable. The physical findings in this so-called disease have been adequately described over and over again and are common knowledge to most physicians. This syndrome usually occurs in patients who have some other primary disease. Frequently these individuals are benefited very much or relieved entirely of their spastic vascular changes when the primary disease is adequately treated. The conditions that are very frequently associated with Raynaud's phenomenon are sclerodactylia, thrombo-angiitis obliterans, arteriosclerosis, syphilitic arteritis, rheumatic arteritis, cervical rib and traumata to the hand as a result of working with vibrating tools. If Raynaud's disease is to be considered a specific entity, we should restrict its use to those cases which are not associated with any of the above conditions or to similar disorders. A small percentage of the cases fall into this group and Hunt[1] in reviewing approximately five hundred articles on the subject found only thirty such cases.

Much has been written describing the physical findings and the results of sympathetic surgery, but very little has been said about the possible importance of psychogenic factors. Raynaud[1] in his original thesis states "the determining cause is often the impression of cold, sometimes even a simple mental emotion is enough." It appears certain that many attacks are at least precipitated by emotional stress and that some are probably the direct result of psychogenic factors. It is with this feeling in mind that this study was undertaken.

In the literature mention is often made of emotional stress, but very few authors do more than this. Many authors have reviewed Raynaud's thirty-one cases and it has been concluded by most of them that only one of his group was a true case of "Raynaud's disease." This was Case No. 5. If one reviews this case, he quickly comes to the conclusion that the patient was subjected to severe emotional stress for at least six weeks before her mother's death. Her mother died of tuberculosis and the patient slept with the mother for a period of six weeks just prior to her death. It was approximately one month after this that she developed Raynaud's phenomenon. There was no other associated disease. Hunt[1] feels that Raynaud's phenomenon occurs in a group of individuals that he classifies as "hereditary cold fingers" and makes the statement that this group, who are usually young girls or boys, frequently have attacks of cold fingers and that it seems to have hereditary tendencies. These attacks usually clear up when the patient gets older. He did not feel that in this group emotion was ever a precipitating factor. He also feels that in cases of so-called true Raynaud's disease that there is no definite relation to psychoneurosis, but in spite of this feels that emotion will precipitate attacks in approximately fifty per cent of these cases. At least one of his cases obviously had a psychoneurosis and her attacks most frequently were brought on by thinking or talking about her emotional conflicts.

Johnson[2] in 1939 studied twenty-two cases with Raynaud's phenomenon and found that in only three were "emotional spells" the apparent cause of vascular symptoms. These three were treated with surgery of the sympathetic nervous system with very poor results. He cites briefly one case that received relief from her symptoms when she was reassured that she did not have diabetes. Her symptoms had been present for about nine months. Just prior to the onset she had been told by a physician in a reliable clinic that she had diabetes and apparently was very much concerned about this until reassured that she had no such disease. He also men-

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tioned a case seen by Doctor Joseph L. Miller in which Raynaud's symptoms disappeared after an automobile accident. He also found that six of his twenty-two cases had attacks which were occasionally precipitated by emotional stress. He places emphasis on the importance of the relief of anxiety in treatment of these cases.

Peet and Kahn[3] in 1936 emphasized that many rather typical cases of Raynaud's phenomenon frequently occur in hysterical patients and Kahn feels that there is a definite cortical or subcortical control of the sympathetic nervous system. Osler[4] felt that some of the most severe cases of Raynaud's phenomenon occur in hysterical individuals. Clymer[5] mentions a case which he felt exhibited wonderful control over the hue of his face, the face becoming flushed or deadly pale as he wished. This same individual could produce at will a contraction and roughness of the skin with prominence of the papillae and erection of the hair. This case suggests voluntary sympathetic control. Maxwell[6] mentions a case who could do essentially the same and invariably the erection of the papillae was accompanied by a reduction in the volume of the fingers. This suggested that the patient could produce voluntary vasoconstriction. Whitfield[7] referred to a case of Raynaud's phenomenon that when he contrived to upset a heavy tray of notes onto the floor with a sudden noise several of the patient's fingers became ivory white. Angell and Thompson[8] felt that all emotional states, agreeable or disagreeable, produced vasoconstriction.

This might be true while the patient is at rest, but I have found that most patients who have demonstrated a vasoconstriction with induced emotional stress show a marked tendency to vasodilation when an agreeable state is suggested to them. Camp[9] describes an interesting case who came to him because of hysterical paraplegia and also attacks of blanching of the third fingers followed by redness, swelling and pain. When the patient was successfully treated for her hysterical paraplegia, she experienced no further attacks of circulatory disturbance. Weir Mitchell[10] describes a case of unilateral edema in the paralyzed side of an hysterical patient and found that pricking with a pin during the stage of edema produced no bleeding.

Recently Heinbecker and Fisher[11] made an attempt to explain the mechanisms of spastic vascular disease of the extremities and came to the conclusion that this phenomenon was not primarily dependent upon the dysfunction of enervation, but rather to a local trophic etiologic factor. They based their conclusions on the fact that local anesthetization of the nerve supply to a digit during an attack did not completely relieve the spasm, and that surgical removal of the nerve supply of the limb which exhibits Raynaud's syndrome does not prevent the development of attacks in well advanced cases. They felt that cold, and emotional excitement are very frequent precipitating factors. It is very interesting that they also feel that in emotionally unstable individuals the attacks may be favorably influenced by the institution of a proper psychotherapeutic regime. No figures were given as to the frequency of emotional stress acting as a precipitating element. They made a study of the effect of changing environmental temperature in individuals with Raynaud's disease and in normal individuals and found that in persons afflicted with Raynaud's phenomenon that skin temperature approached the environmental temperature more than do those of normal persons.

Mittelmann and Wolf[12] carried out rather extensive skin temperature studies and made an attempt to observe affective states which were accompanied by skin temperature changes and to determine the degree and duration of these changes. They also made an effort to ascertain the clinical significance of such reactions in subjects with cold hands and Raynaud's syndrome. They had the opportunity of observing skin temperature changes in five persons with Raynaud's syndrome and give rather detailed results on one subject. It was found that a combination of coolness brought about by inadequate clothing, low environmental temperature and induced emotional stress produced the most disturbing symptoms and they felt that these conditions closely simulated situations occurring in daily life. Their experiment demonstrated that emotional stress could produce the types of pain found in patients with Raynaud's syndrome. However, they believe that a low environmental temperature of twenty degrees will not produce an attack whereas emotional stress and a low environmental temperature of twenty degrees will produce a

severe type of pain. Induced emotional stress with a room temperature of twenty-six degrees centigrade did not produce any pain. They found that the other four patients afflicted with Raynaud's syndrome had similar effects of stress. When one patient was placed in a room with a temperature of twenty and five-tenths degrees centigrade with inadequate clothing, that is, not enough to maintain the general body temperature, and subject material concerning a specific unpleasant life situation discussed, there was a skin temperature drop of thirteen and five-tenths degrees centigrade. When patients with Raynaud's disease were placed in the experimental situation with induced emotional stress, they did not differ essentially from other subjects in regard to (1) nature, (2) magnitude, (3) the speed of the fall in the temperature of the fingers. The only real difference they noted was the presence of pallor, cyanosis, pain and redness.

Recently I have had the opportunity of treating a fifteen-year-old girl who suffered from rather typical panic attacks. She has a psychoneurosis and certain vascular changes which are very suggestive of early Raynaud's disease. Her panic attacks are always accompanied by marked coldness of the hands, hypesthesia, and cyanosis. Occasionally these attacks have also been accompanied by marked pallor of all fingers up to the second phalangeal joints. The panic attacks last about one minute, whereas the cyanosis and hypesthesia of the hands continue from ten to thirty-five minutes. A brief summary of the history, physical and psychiatric findings is as follows:

Family History—Patient's paternal and maternal ancestry revealed no outstanding deviations with the exception of those noted in her parents. Her father's instabilities of character, alcoholism and peculiar social behavior contributed to the unsatisfactory early home life of the patient. Her mother is an odd appearing individual, reacting to tension with tearfulness, but apparently able to superficially maintain the home with some aid from relief agencies. Patient has four other siblings and all are described as being "nervous" under stress.

Personal History—The patient was fifteen years of age at the time of this study. She was born in an urban area of Northern Michigan. Birth, early development and school history were not unusual. Menarche in February 1942 was followed by normal menstrual history. Past health history considered good. When the patient was ten years of age her parents were divorced. Although she had shown no outward signs of conflict over the father's behavior, she appeared relieved when he was no longer a part of the home. Patient's social and recreational interests, while limited, have been along normal lines. In personality, she has been a reserved, quiet and friendly child, not particularly sensitive or demonstrative.

Present Illness—Patient's symptoms were first noted on March 7, 1942, and were described as "difficulty in swallowing." Twenty-four hours later the symptoms returned and were associated with a marked panic reaction. On the third day there were two similar episodes. These panic attacks were accompanied by coldness of the hands, hypesthesia and cyanosis. The family physician who was first consulted thought the symptoms might be due to the menarche which had occurred the previous month. She was treated symptomatically. Finally she was seen by two other physicians and it was recommended that she be admitted to the University Hospital.

Physical Examination—The physical examination demonstrated that the hands were very moist and showed a mild degree of cyanosis. Tonsils were hypertrophied and injected. Oral hygiene was poor and there were no other significant physical findings. The neurological examination demonstrated varying areas of hypesthesia and anesthesia, but was otherwise negative. Blood examination showed a mild secondary anemia and other laboratory findings were essentially negative.

The patient is a fairly attractive, fifteen-year-old girl who does not spontaneously express any complaints. There were no obvious psychiatric deviations. She described her panic attacks as starting with an uncomfortable feeling in the back of her neck followed by difficulty in breathing, dizziness, palpitation which was followed by marked perspiration of the hands, coldness of the extremities with cyanosis and occasionally with pain. During interviews she was frequently evasive and was always protective of her family. Often she would answer questions with "I feel all right, I am not worried, everything

is all right at home." She denied any interest in boys, stating that she was not old enough to have any such interests. In subsequent interviews it was found that the patient would always become very tense when questioned about sexual matters or her feelings towards her mother and father. She was very resistive to exploratory psychotherapy and the interviews were always necessarily conducted on a superficial level. Much of this was due to her early training and the fact that her mental age was twelve years, six months, with an intelligence quotient of eighty-five.

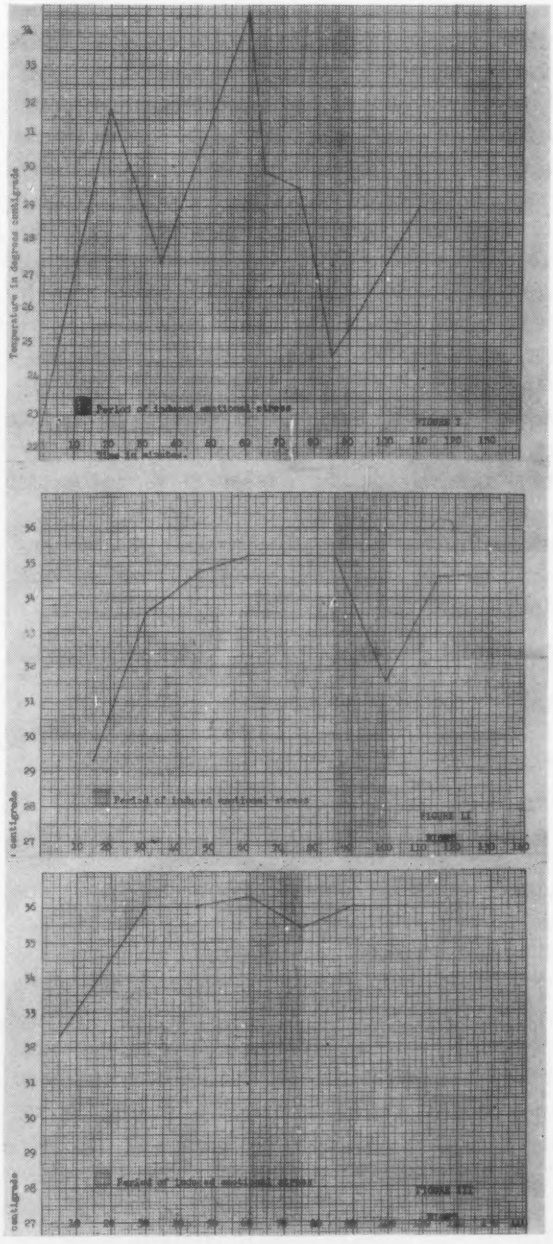
In this case an attempt was made to investigate the effects of induced emotional stress on the skin temperature and the color of the hands and fingers.

Method—The room in which the studies were carried out was partially sound proof and provided with thermostatic control. The usual temperature of the room was seventy-five to eighty degrees Fahrenheit. Readings of skin temperature were obtained by means of the Hardy radiometer. Patient was placed in a comfortable bed with a sheet covering the legs and trunk. Points selected for study were the mid-phalangeal joints of the third and fourth digits and dorsum metacarpal regions of both hands. These selections afforded a check on possible technical errors. The patient had a series of studies, the initial one permitting the patient to become accustomed to the procedure and providing the examiner with a record of the patient's reaction under the controlled environment.

Results—During the first two controlled periods of observation it was found that while the patient was at rest without any stimulation there were noticeable fluctuations of the skin temperature. These fluctuations were more marked than in an average psychoneurotic. During another period of observation the patient showed definite signs of anxiety and tension while being interviewed, especially when she was asked personal questions about sexual matters. During this interview she demonstrated a sharp fall—nine and nine-tenths degrees centigrade—over the finger areas. When the interview was terminated there was a very sharp rise (Fig. 1). On another occasion when the patient was questioned about her feelings toward her mother, father and the home situation in general she demonstrated a drop of seven degrees centigrade over the fingers areas and when the interview was terminated there was a sharp rise on suggested relaxation.

This patient has been under treatment for approximately eight weeks and her panic attacks have become less frequent and the spastic vascular changes are less marked. I have been unable to work out the specific psychodynamics, but I feel quite sure that there is a direct connection between the panic attacks and her vascular manifestations.

I have found that certain types of psychoneurotics seems to show more of a drop in



skin temperature under induced emotional stress than others. In general, I have found that patients suffering from an anxiety neurosis or an anxiety hysteria show more marked skin temperature changes than those of obsessive-compulsive type. In the group that is prone to show outward signs of tension and anxiety, it is very common with induced emotional stress to find an abrupt drop in the skin temperature of the extremities. With the obsessive-compulsive group, it is frequently found that with the discussion of deep conflictual material, there will be very little change in the skin temperature (Figs. II and III). In a control group consisting of twenty-five patients who were admitted with various somatic disorders not one showed a drop of more than three degrees centigrade with induced emotional stress. The experiments were carried out under the same conditions as those described above. It was very difficult to evaluate the findings in the controls because many of them undoubtedly had an undiagnosed psychoneurosis.

During the past two years twenty-one patients examined at the University Hospital were diagnosed as having Raynaud's syndrome. In reviewing these cases, one is reminded of the literature on this subject in that mention of the presence of emotional factors is seldom made. Mention of the possible significance of psychogenic factors was recorded in only five of these twenty-one cases. I am convinced that such factors play a more important role than one would be led to believe. One of these cases happened to be recalled by the physician who treated the case and he stated that she was in a state of acute conflict at the time of her hospitalization and that after a short period of psychotherapy the vascular changes were no longer present. This state of emotional conflict is not mentioned in the case record and the same incompleteness of the record was in all probability present in other cases.

Summary

Observations in one case do not warrant drawing conclusions, but the findings suggest that psychogenic factors play an important role probably in the production of spastic vascular symptoms and surely are frequently precipitating factors. It is difficult to make an adequate investigation of this subject because of the relative rareness of the syndrome. Nevertheless since we have such accurate instruments for the recording of physical changes, it offers a fertile field for investigation of psychosomatic problems.

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Treatment of an Obsessional Personality With an Acute Psychotic Illness

(A Clinical Report) *

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This paper deals with part of the treatment history of an obsessional woman patient, age 40. She has been under treatment with me for two years and still is under my care. Previous to entering Chestnut Lodge and psychoanalytic treatment there had been a long history of emotional upheavals, difficulties in living, imminent psychotic breaks accompanied by physical symptoms and one actual psychotic episode. This history made me decide for certain departures from classical technique. I felt that I had to pave the road for psychoanalysis proper by a good deal of supportive psychotherapy. This was designed to give her enough security with me to safeguard, if possible, against the dangers of another psychotic episode while gaining painful psychoanalytic insights. Two operations the patient had to undergo while under treatment with me, a hysterectomy and a tonsillectomy, gave the opportunity to follow this scheme. So far we have succeeded in obtaining considerable improvement in the patient's condition and in avoiding psychotic relapses.

Here are some further data of her life history pertinent to the course of treatment. To the average individual she appears to be shy, retiring, but easily approachable, unobtrusive, pleasant-looking, and attractively dressed in sport clothes. Toward me or anyone at Chestnut Lodge, she has been bossy, irritable, faultfinding, tense, and gives one the feeling that she has a conviction of some impending disappointment or disillusionment. It would seem as though to outsiders she hides her hate, resentment and rebellion behind her generally benign exterior.

To give some idea of her problems, I quote her statement to me when I first saw her: "I am afraid that I am going to get my symptoms back again, that I will use them as substitutes, especially diarrhea. I am afraid of being a failure and that I shall attempt suicide."

Her family comes from the upper brackets of middle class society of English origin and is comfortably well off. Her father was a member of an important business firm. He died in his forties following an operation prior to the patient's birth. Her mid-Victorian mother is reported by one history to have been "of a nervous temperament." The patient states that she was continuously asking her mother and sisters, "Do you love me?" accompanied by demands for demonstrations of this love. Her sisters were not only no playmates for the patient during her childhood but treated her in much the same manner as her mother did. Being born a posthumous child, the patient called her oldest brother "father-brother," but he never accepted her opinions and often treated her as of no account. Her second brother, Alec, four years her senior, was the only one in the family who treated her as an individual but he became psychotic, his first episode occurring when she was eleven. Since her brothers were older she was continually on the fringe of their activities. No doubt many times they would have been willing to include her but did not because she was a girl and she did not have any girl playmates of any age until she was twelve years old, so with this set-up she built up a phantasy life of her own, clung to mother, and learned to use illness as an attention-getting drive as well as an expression of rage turned against herself.

Since she had been active in athletics in high school, she decided to follow this type of work but eventually made the decision that she didn't like physical education because a person must be aggressive and competitive, which to her meant being destructive and which made her uneasy for fear that her repressed aggressiveness might come to the surface. Therefore, she went into child development. This, she felt, gave her an opportunity for constructive, non-aggressive work and for an expression of her maternal attributes. With this went a broadening of her interests and activities. In one teaching position she kept

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records of the children on the basis of which she wrote a manuscript which has received some favorable comments but which has not been accepted for publication. She has written various short stories and articles which have been published. She has some poems in a children's collection. She has taken painting lessons with two different men and has canvasses which have been in exhibitions. She is artistically inclined in various types of handwork and has created some unique and useful articles.

The patient told me that when she was four years old the family doctor performed an operation on her genitals which, from her description, must have consisted of a "pushing back and cutting" of the membranes around the clitoris. She now expresses many opposing ideas about this operation which she remembers she had at the time, such as: She thought the operation was performed to punish her for masturbation; that by masturbation she would get a penis; that the surgeon was taking away her penis and also that he was going to give her a penis. Following the operation she kept her fingers away from this area in order to let the illusory penis grow. She remembers asking her sister about when it would grow and her sister replied, "You silly little thing. You will never have a penis." This meant that she would never be like her brother, i.e., loved by her mother as the brother was. The patient says, "Then I went into an awful slump. I didn't want to eat, I was depressed, there wasn't anything which would give me any pleasure. Then my mother called a neighbor and asked if I could come over there to play, and I thought that because my mother did this she loved me and then I felt better." The patient further explains that this operation hurt and that she thought by being hurt that she would get a penis and then she would be able to do all the wonderful things her brothers did.

She had a nervous breakdown when twelve years of age when she was studying music and had difficulty in getting her lessons. The teacher didn't understand that a considerable portion of the difficulty was emotional. She didn't help her and the child became worried and troubled.

After finishing high school, at sixteen years, she matriculated in a school of applied design, but found that this was not the approach to art in which she was interested. However, she didn't know how to withdraw gracefully; she became worried, sleepless, irritable, troubled, sick in bed, developed diarrhea, and was afraid of going out of her head. The family physician took her to a surgeon. The two doctors discussed her condition in medical terms before her, advised her to have an appendectomy because of her diarrhea, and talked about the mortality rate in such operations. When talking about this operation she says, "I had a room on the eighth floor. I had supper in that room. It was an upper room, wasn't it, in which Christ had supper? He was crucified. Does that mean that he was nailed to a cross? Was he actually nailed to a cross? I wasn't going to be cruicified but maybe I thought I was. I felt as though I was on a cross; that is, on a board, or I felt stiff as a board. I put my head out of the window and was thinking about being on the pavement below and that my head was bleeding. I was going to be hurt so badly that I would die. They were going to operate on me and I was going to die. Yes, I got that idea because the two doctors were talking about the fact that some of their patients do die."

Ten years later, when she was teaching physical education at the University of Chicago, a girl working in the gymnasium jumped out of a window and injured her face. Some employees brought her into the gymnasium and the patient was asked to look after her. The patient says that at that time she recalled her former feelings about jumping out of the window and they have stayed with her ever since.

Following her appendectomy, she continued to have diarrhea. On various occasions she tried to make the physicians understand that the diarrhea was due to nervousness, that in some way it was connected with Alec's sickness and death, but they couldn't seem to comprehend this and administered the treatment which they considered to be indicated. During her stay with me she has talked about diarrhea as "energy gone wrong," as "energy gone down the drainpipe," but she has not been aware of it as an expression of an emotional conflict.

In one school the patient was asked to teach a grade for which she was not trained. She states she became worried just as she did when she couldn't get her music, was quite

excited, irritable, couldn't sleep, developed diarrhea, and went home on her week-end feeling that she was a failure. Her family physician referred her to a psychiatrist with whom she worked for two years, and since her diarrhea stopped she considered her condition to be cured. She says that she had gone to this psychiatrist also to find out why she had to become insane like her brother and why she felt that she was a failure. In a later teaching position she became suspicious of the teachers and thought that they were criticizing her teaching methods unfairly. Eventually she heard that they had recommended that she would make a more satisfactory adjustment in a less-complicated position. She resigned this position but with a feeling that the teachers had been unfair and unjust to her which gave her a feeling of not being accepted.

Although she secured another position, the set-up was even more complicated than in the previous one. She became apprehensive concerning the parents' attitude toward her since she was expected to appear at teas and other social functions put on by the parents for the teachers; that is, she felt she was always under their supervision and must meet with their approval. She couldn't handle the children to her satisfaction. She was afraid that everybody was thinking she was queer; things became so confused that she just couldn't seem to get them together. What psychiatric treatment she could secure during about a six-weeks period was not sufficient to give her the needed confidence and security to continue her work in a comfortable manner. She finally resigned her position.

The following day she thought she was cut off from everybody, that she should not pay her room rent which was then three days overdue because she would need the money as something was going to happen. She had some mixed-up ideas about her previous psychiatrist. She had visions of herself sitting on the sidewalk on her furniture; she was puzzled over what to do about her manuscript and records. That night she slept very little, still trying to get some order out of this confusion. At six o'clock the next morning the patient called a friend, telling her that she was going to be evicted and asking her to come and get her manuscript and records—the remaining tokens of rational contact with reality and symbols of security. A member of the school board had telephoned a sister, who arrived early in the morning. During the day the patient got along in a fairly comfortable manner but became progressively less so as the night wore on. About 1 A. M. she suddenly made a dive to jump out of the window. She says, "I wanted to jump out of the window in order to punish myself because I had resigned, because I had let these people down, because I had made a mess of things, because I wanted to get away from my sister whom I love more than anybody else in the world except my mother. I had made this mess and I thought that I should handle the situation myself."

Although the patient has not yet put together her ideas associated with her eviction phantasy, I feel certain that this phantasy represents her deep unconscious conviction that her mother did not love her, that she was at best merely tolerated by her mother and that even this tolerance would not survive any independent action on the patient's part or any expression of hostility against her mother. The throwing up of the job was such an independent action and was an expression of hostility toward the school authorities (mother substitute) who were making unwelcome demands on her. Hence she expected a drastic rejection, which took the form of the eviction phantasy.

She was admitted to a psychiatric hospital where she was noisy, agitated and suicidal for the first few days. Gradually she became aware of things about her, expressed various delusions about her former psychiatrist, her sisters, people in the town where she had been teaching, the doctors who came in to see her, her room, and many things did not seem real to her. She says, "I thought that everybody's name I called out was dead or insane; that is why I ate the paper—the Kleenex which I tore up—because I wanted to keep them; that is, my niece, mother, girl friend, and sisters." Following this acute psychotic illness she remained on convalescent wards for thirteen months where her behavior was much the same but more exaggerated than during her four-months' stay at Chestnut Lodge. She was discharged with the understanding that she was coming here, which was interpreted by her as a rejection by her former woman analyst, an eviction by another mother substitute.

Hence I felt at our first interview that I

should make a specific point of asking whether she thought she could work with me. Some time later she told me that she liked me because I had taken this attitude. During the first few appointments there were other fortunate happenings, such as when she asked me whether I thought she was going to get sick again; that is, whether she would become the way she was when she was acutely sick, and I told her that I didn't know. Answering her in this manner meant to her that I wasn't doing anything to fool her. She says, "I like you because you don't promise me that I won't get sick again." During the acute part of her psychosis she had asked one of the doctors whether she was psychotic and he had replied, "No, only nervous." She said, "I knew he was lying to me because I knew I was crazy."

During the first several weeks at Chestnut Lodge, the patient was restless, irritated with the hospital activities, and wanted some of her own. She said she would like to look up various individuals in the vicinity whom she knew and to visit schools, all of which she did. As a result of her renewal of old friendships and and visiting schools, near the end of her third month's residence one of her friends was instrumental in her securing a teaching position in a neighboring town. This friend and authorities at the school knew of her training, qualifications and experience and the fact that she was at the Lodge made no difference to them. About a month later the patient was discharged and made her own living arrangements.

During this period of time the patient gave me the history of her psychotic episode in spasmodic accounts—a little here, a little there, with frequent interruptions containing current or less disturbing material. At many interviews she was acutely disturbed, crying, whining, and kicking the couch. Very often she seemed to spit out her words or she would demand that I talk with her about the particular situation in question. With all of this acting she seemed always to be watching me to see what my reaction was going to be; that is, whether I was going to reprove, condemn, reject, or accept her. One day while talking of her past experiences when she was quite upset, she said, "You hurt me, making me do this," meaning, making her talk and tell these things. Some interviews were like violent thunderstorms with clearing and sunshine afterward and I would marvel how well she would get along during the interim. Throughout our contact I always let her set her own pace without interference on my part except where I thought it was desirable for her own safety. Because of both of our schedules it was necessary to give her an appointment before she went to school and she did not wish to go after she had been crying or upset. Therefore at times progress has been slow as though marking time, while at others it has been rapid and eminently satisfactory. After she began going in town she expressed various suicidal ideas in connection with riding on the bus, but talking about them eliminated them. There were fears of jumping out of her window or of doing injury to herself. At night before retiring, she would place a table in front of the window so that she could not get to the window without being thoroughly aware of what she was doing.

At the fifth interview the patient related the following dream: "I was with another girl. There was a rocky stream which was running downhill. I suggested that we go in and swim there. I had had a swim in such a stream before and liked it." The patient (motioning to the right) said, "Over there was a broad expanse of water. There were no waves on this water. There was a rocky bank along the expanse of water which had been put there by someone. I was in this water swimming and scrambling around. There was a boat there. There was a person in the boat. You were the person in the boat. I knew that you would come and get me if I needed you but you knew that I didn't." I cite this dream as giving a clear and graphic account of the patient's conception of my role in her life at this period. She wanted me to be a dependable mother, watchful of her needs and ready to help, but not oversolicitous or interfering.

Without making any comment or giving me the opportunity to do so, she jumped to discussing the possibility of taking a camp job and wanted to hear my opinion about the details involved. About a month later this job question came up again for consideration. By this time I had more of an idea of the extent of her feelings of insecurity, conflict about dependence versus independence, and compulsive drives. So we talked quite frankly about the situation and I repeated to her some

things which she had told me. She finally said, "You know, I'm relieved that you don't want me to go to camp but it is hard to take." It was as though she had been putting up a front of being "weller than I am," and my attitude meant to her, as she later told me, that I was really interested in her and wanted to help her.

On many occasions she talked about herself in various ways; for example, "There was something which went wrong in my childhood but it went much worse in my adolescence." When talking about her desire for direct answers and being told that a direct answer would interfere with our reaching hidden emotional material, she replied, "There is a part of me which wants you to make direct answers, which wants you to make my decisions, to take over the responsibility for me, to allow me to still continue to be a baby. There is another part of me which doesn't want that." In much the same manner she has talked about her desire for perfection, her feelings that she is a failure and has expressed many depreciatory attitudes toward herself. She has indicated her confusion about the difference between boys and girls and that she is not really sure which she is. One day she reported a dream that someone was biting her breast and she said, "I know that girls have breasts and boys have penises." In a manner characteristic of her, as she would be talking perhaps about something at school she would suddenly say, "I don't want to be a boy, I don't know why I say that, I know I want to be a girl." Or another example: "My penis itches; I don't know why I say that, I know I don't have a penis."

She does not have any conception of the extent of resentment, rebellion and hostile feelings which she has for her mother. She often talks about how much she loves her, that she gets along with her more satisfactorily than her sisters do, and at the same time she is envious of her sisters because they are home and take care of mother. She has been able to express these repressed feelings regarding her mother in terms of her relationship toward me in a variety of ways. Her oft-repeated phrase, "Do you love me? I want you to love me" are repetitions of her mother's inquiries. On various occasions she has expressed anger toward me in no uncertain terms. A year ago Christmas she made a wood block for a Christmas card and gave me one of the prints. She did not approve of the way in which I exhibited it, and when I put it away she expressed her anger vehemently.

I have an oil painting hanging on the wall at the foot of a couch. She has seen several paintings by this same artist and considers that their composition is not good. She does not like this one in particular and admits that she is jealous because I exhibit it and not one of hers although she has not even asked me to select one of hers. One day in a burst of anger after throwing Kleenex wads at it, she got up and hung a napkin over the painting, saying that she could not look at it. Another time she was so angry at me that she said she wanted to kill me because of a mistake I made, which I frankly admitted, and then she said she liked me because I admitted it. On various occasions she is aggressive and competitive, as we know her to have been with her brothers. She inquires about details of my personal life and wants to test my information and ability to deal with reality requirements. Admittedly, she wants to annoy and trouble me—this especially if I touch a sensitive point. One time when not satisfied with my facial expression when she was lying on her stomach talking to me, she said, "You should have a series of masks which I could put on you so that I could make you what I want you to be." She very often asks me whether I hear what she says, saying she wants to know whether I am awake or asleep. She keeps track of her own time during the hour and wants to know whether I keep track of it also. On various occasions she has requested me to put my fingers around her wrist as a proof of my love. When terribly disturbed she has sat on the end of the couch next to my chair and wanted to hold hands. She often says that she must do what pleases me or she is afraid I will reject her. In some of these instances she is treating me in much the same manner as she was treated by her mother, while in other instances I am very much the mother and she is the child.

Some months after the start of her treatment with me, the patient consulted a gynecologist because of excessive bleeding and she was advised to have a hysterectomy for fibroids some time within a year. During the following months her hysterical and obsessional behavior became more marked.

Throughout this period when talking about the operation, she would often say, "I don't hear what you say," "I don't want to hear what you say." She explained that she was not afraid of the operation as such but that she was afraid of all the things in the circle around it. These things included not only the fact that she had a tumor instead of a baby, that she was going to have her uterus out and she was afraid she would lose her femaleness, but the operation meant a repetition of all the attitudes and phantasies connected with her childhood operation. But even more important than these fears was that of jumping out of the window and of becoming insane. Both she and Alec had tried to jump out of windows and they had both been insane. She demanded additional appointments and because I gave them to her, she was able to maintain her calmness and assurance while working even though at interviews she often cried, whine, complained, refused to listen, demanding and, as it were, clutching at twigs for security. She was troubled by various physical symptoms, of which the most outstanding was her backache.

The following dream, with her associations and my interpretations, is characteristic of the trend of the treatment and her emotional reaction toward me as a person and as a representative of the world at large during this period: "I had a dream last night; it was the most peculiar thing. You get your paper and write it down." Then the patient turned to talking about other things in her characteristic manner. Eventually she came back to it. "A pickle I'm in. You know I have told you that my people are very unmusical. I can't carry a tune. I don't know when I'm off the key. In this dream I was to sing in front of a group of people. I got myself into this pickle. I can't sing. I didn't know what to do about it. I wondered, 'Could I make a joke out of it? Could I say, "I can't keep on the key?' " The song I was to sing was some sort of a lullaby like 'Bye, Baby, Bye.' As I was going to the place where I was to sing I tried to think what I could do. The situation looked worse and worse all the time. On my way there I ducked under some climbing rose bushes full of brambles and no sooner did I get out of one clump of bushes than I would get caught in another bunch, either under my feet or over my head and I thought I would arrive there all disheveled. I didn't feel jittery. I knew I was going to do something. Because of the scramble I arrived late, which was mentioned. That is, a woman did, and I said, 'Oh, am I late?' The ladies were all sitting on the porch—you see, this was to be an informal affair—and then I woke up."

Associations: The patient says: "The brambles were a way of delaying to get there and of delaying to face something I knew I couldn't do. I know that I can't get rid of the pain in my back until I am operated on and I make a joke of it. The rose thorns are delaying progress. If I could have said, 'Now, I can't sing,' that would have been a way out. I could have said, and this is what I should have done, 'This is a very bad mistake, I can't sing.' I had thought maybe that I could talk in a singing voice or that I could have whistled. I can whistle in two keys at once, but I was trying to bluff it. My back just comes out of me. The tangles of rose bushes and thorns are what is delaying my getting analyzed. I am refusing to acknowledge that my back aches; that's the way that I feel, all tangled up in the rose thorns. I can't get loose from them." My reply was: "I am wondering whether there is some other meaning to those rose thorns and being tangled up in rose thorns than the backache. The patient replies: "Well, I can't get at what bothers me." And I continued: "It seems to me that there are some other things here which I would like to bring up at this time. There are two things in particular which I have in mind. The first one is the more recent. When you were talking about your backache I had the impression that you talked about it as though you expected that I was going to do something about it. Isn't that the way in which you talk about various things at different times? My second thought is that when you started out in this hour you told me that you had had a dream and then you went ahead talking about other things as though to hold my interest, as though to keep me from leaving or as though to annoy me. I wonder whether you realize that that is the way in which you do a great many things?" The patient replies: "I don't remember the first point you made, but about the second one, I do want to hold your interest. This attitude of talking and then delaying is a kind of withholding, a with-

holding of the treasure. It's like what the children do, they withhold their bowel movements. Their bowel movements are so precious. Oh, yes, I remember about the first point now. That I think that you should do something about my backache. You see, a part of me thinks of you as God still. You are so powerful that I wish that you could do something about it. In regard to the withholding, I withhold things so as to show you that I'm not completely under your thumb, that I am powerful, too. But about this backache: one part of me feels that I'm making this thing all up and that I mustn't let it interfere with my pleasure, so if I want to stand up, I stand up; if I want to walk, I walk; because a part of me thinks I really don't have a tumor, I don't have a backache, I don't need to have an operation. Nothing seems real; I don't have a tumor; I didn't go to see Dr. Blank; I don't have the backache; I don't have to have an operation. But when I talk that way I know that I am very sick and I know that I am very sick when I think that way. I guess I think that if I just deny something it won't be there. I know that all of these things which bother me are the brambles."

As the time of the operation approached it became more and more apparent how obsessionally consumed she was about her own security. She demanded all sorts of emotional safety devices from the surgeon, nurses, and above all from myself. For the reasons stated at the beginning of this paper, I gave in to her requests.

Recently she was advised to have a tonsillectomy and she chose a specialist whom she had known for many years. But she found when talking with him that he did not understand her fears connected with having an operation and would not cooperate with her. When telling me of the incident before the operation she whined, cried and kicked, complaining in her hysterical manner like a frustrated child in a temper tantrum. This time she needed much less support from my side and I could even venture to ask her whether her reaction was to spite the doctor. Her attitude entirely collapsed, like a toy balloon with the air let out, in a most astounding and dramatic fashion. She said, "I don't want you to tell me things about myself I don't like, but now that you have brought it out into the open, I feel better." She went through the operation without any difficulty. This is an example of her behavior when she feels frustrated; of her attitude toward herself and toward me.

Since then she has been accepting with hostile comment but with little disturbance, minor frustrations. I am becoming more casual with her in response to her demands and she in turn is more realistic in her attitude. Recently she told me, "I don't want to tell you this, but I am enjoying my work at the school; I go there unafraid. When I first started I didn't think I could ever teach again. Now I am confident and I can depend on my own judgment. I am not stirred up on the inside as I was when I was teaching ten years ago or even twenty years ago." She is slowly building up a circle of friends, is painting and still hopes to get her manuscript published.

This report presents a method of treatment of an obsessional who has had a period of hospitalization characterized by persecution delusions before entering psychotherapy. She so dreads another psychotic flare-up or the experiences of her psychotic brother that she is not only cautious about spontaneous productions but is always trying to ward off the many stimuli coming at her from all sides. By my continuous indulgent practical support and encouragement in the undertaking of actual satisfactions—teaching, writing, painting—with the hope that actual success and actual contacts would result—I have given her sufficient security so that she could build up the necessary confidence to permit spontaneous interchange without retiring into delusional misinterpretations until at last she became ready to cooperate in actual psychoanalytic psychotherapy.

A Study of Spinal Fluid Protein and Sugar (Dextrose) in Cerebral Arteriosclerosis and Senile Dementia*

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In a discussion in this clinic of the differential diagnosis between cerebral arteriosclerosis and senile dementia, the question of spinal fluid protein was raised. The opinion was held that there was an increase in the case of cerebral arteriosclerosis, due possibly to the areas of softening and calcification. The writer questioned this opinion and undertook this study. Since no opinion was expressed as to the sugar (dextrose) content, we included that in our case reviews. Before going into this discussion, we would like to review briefly some spinal fluid considerations.

The consensus of opinion seems to be that the cerebrospinal fluid is chiefly formed in the choroid plexus which lies in the walls of the ventricular system and is made up of a meshwork of blood vessels arising from the choroidal arteries. The plexus is covered by an epithelial layer which is a continuation of the ependymal lining of the ventricle; thus the plexus projects into, but does not actually lie in, the ventricular cavity because of this epithelial lining. The choroid plexus tufts are largest in the lateral ventricles. Evidence is not sufficient that the ventricular ependyma plays any important role in the production of the intraventricular fluid. However, since it has been demonstrated that there is a difference in the constitution of the ventricular and subarachnoid fluids, and results point to a diffusion of certain substances from the brain vessels into the periadventitial spaces, it would seem that the extraventricular cerebrospinal tissues may have some connection in the formation of cerebrospinal fluid.

The manner of formation of cerebrospinal fluid is not as yet definitely established. One school holds to the thought that it is definitely secretory in its formation,[2] based on the histological arrangement of the plexuses and the pharmacodynamic effect of certain drugs (reputed to be glandular stimulants) on their structure and on the rate of production of cerebrospinal fluid.

Opposing the choroid plexus theory is the theory of dialysis based on the similarity between the composition of an artificial blood ultrafiltrate or dialysate and that of the cerebrospinal fluid. It would certainly seem that it was a filtration process through a semipermeable membrane, the membrane in this instance being made up of the capillary endothelium and the overlying layer of epithelial cells. The cerebrospinal fluid contains many of the constituents of the blood plasma in about the same proportions.[1] A change of any great degree in the glucose, sodium chloride and urea concentrations in the blood is quickly reflected in the fluid. Against this is the fact that even when highly concentrated in the blood stream, all colloidal substances and certain inorganic materials like sodium iodide and sodium nitrate do not pass through the membrane into the cerebrospinal fluid. For example, with deep jaundice the spinal fluid remains relatively clear. From this it would be reasonable to assume that the permeability of the membrane could and does change with toxicity, disease, etc., and that it could be a reflection of the general body well being and, at the same time, there could be an attendant increase or diminution of the secretory mechanism or membrane. As Katzenelbogen[2] states it, "There are, moreover, evidences of spontaneous changes in the function of the barrier between blood and cerebrospinal fluid which suggests a biological functioning, manifesting itself by physicochemical reactions. If neither 'secretion' nor 'dialysis' can be applied to the mechanism of cerebrospinal fluid formation, then the term 'physiological or biological permeability' appears to present an adequate expression of a viewpoint that would be a compromise between the concept of secretion and that of dialysis." Perhaps it is secretory in origin followed by osmosis through the semipermeable membrane of capillary endothelium and the overlying layer of epithelial cells.

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The spinal fluid is in constant circulation in the sense that it is constantly being formed and just as constantly being absorbed; that formed by the choroid plexus in the lateral ventricles passes into the third ventricle by way of the foramina of Munro then through the aqueduct of Sylvius into the fourth ventricle. From here it passes through the medially placed foramen of Magendie and the two laterally placed foramina of Luschka to enter the large cisterna of the subarachnoidal space. The course from here is in two directions: upward to bathe the base of the brain and the surface of the cerebral hemispheres and downward over the surface of the spinal cord in the subarachnoid space. Thus its line of travel is definite.

There is much discussion of the method of absorption of the cerebrospinal fluid.

1) By means of the arachnoidal villi which project into the dural venous sinuses (Weed).

2) Some through the perivascular spaces directly into the blood stream.

3) That which covers the spinal cord perhaps is absorbed into the spinal veins.

4) Absorption by cerebrospinal veins throughout the cerebrospinal cavity (Dandy).

The dynamic forces actuating the circulation of the cerebrospinal fluid are deemed to be caused (Katzenelbogen[2]) (a) by increase during cardiac systole, and decrease during diastole of the brain volume, (b) by venus dilatation during expiration and collapse during inspiration, (c) by movements of the body, especially bowing of the head.

There are at least three important functions of the cerebrospinal fluid (Spurling[1]):

1) A medium for the transfer of substances from the tissues of the brain and spinal cord to the blood stream.

2) A space compensating mechanism in regulating the contents of the cranium.

3) As a fluid buffer against injury.

Having given a brief discussion of formation, circulation, absorption and function, we now pass to a consideration of the normal spinal fluid protein and sugar content. Spurling says protein varies 0.01-0.04 per cent and sugar (dextrose) 0.05-0.08 per cent. Katzenelbogen says that the sugar content fluctuates between 40-90 mgm. per 100 cc. Goldsmith[3] considers a total protein of 50 mgms. per 100 cc. or more as abnormal; Brewer and Hare[4] say the total protein varies from 20-43 mgm. per 100 cc. of spinal fluid. Referring again to "physiological or biological permeability" and accepting the term of a blood cerebrospinal barrier we again quote Katzenelbogen[2]: "Pathological processes in the cerebrospinal nervous system may modify normal ratios of substances diffusable between blood and cerebrospinal fluid in two ways: (a) by increasing or decreasing the barrier permeability from blood into cerebrospinal fluid, and vice versa, (b) by modifying through metabolic processes the content of diffusible blood components into the cerebrospinal fluid."

The question now arises as to whether in cerebral arteriosclerosis and senile dementia we are dealing with a situation in which the pathological processes have modified the permeability of the barrier.

The question now arises as to whether in cerebral arteriosclerosis and senile dementia we are dealing with a situation in which the pathological processes have modified the permeability of the barrier.

Katzenelbogen, in testing of barrier functions, lists the following results:

From this it would seem that in cerebral arteriosclerosis the protein and sugar content would be somewhat higher than with senile dementia. Malamud, Fuchs and Malamud found marked increase of the barrier permeability in various types of psychotic patients with cerebral arteriosclerosis. Out of 10 cases of senile psychosis only one showed high permeability. Hauptmann recorded two cases of senile dementia with quite high barrier permeability. Dalma obtained in one case a slightly increased, and in another a low permeability. Bau-Prussak found a high permeability in a case of arteriosclerotic psychosis and in one case of senile dementia.

Diagnosis	*No. of Cases*	*Permeability quotient Normal equals 2.90-3.30 Percentage of cases Below (Increased)* 2.9;	*Normal* 2.9-3.3;	*(Decreased)* Above 3.3
Senile psychosis	9	11.1	77.8	11.1
Cerebral arteriosclerosis	9	44.5	55.5	. . .

Spurling lists the protein content in cerebral arteriosclerosis and arterial hypertension as normal or plus. Brewer and Hare report increase in fluids from 68 patients; slight increase in 35 fluids between 43-50 mgm. per 100 cc. Thirty cases showed definite increase between 51-100 mgm. Three cases contained more than 100 mgm. per 100 cc. (125, 127, 150 mgm.) and were from patients who had been sick 8 years, 2 years, and 1 day, respectively. Goldsmith[4] ("arteriosclerosis of the nervous system") found one case with less than 50 mgm. per 100 cc. and three with more than 50 mgm. per 100 cc. (range of values 30-100). Weigel[5] in a series of 17 autopsied cases of simple arteriosclerosis reported as follows: "Autopsy, as a rule, showed softenings, all of which, however, were far from the ventricles and therefore without influence on the spinal fluid. Half of these cases had normal fluid, the others showed very slight increase of protein, with prevalence of albumin and were otherwise essentially normal." Reibeling,[6] from a study of some 65 cases, found that "in cases of uncomplicated arteriosclerosis, there are besides many negative results, more findings of increased albumin than in presenile cases. In presenile depression "not seldom" increased proteins (more albumin than globulin). In simple senile dementia, negative findings almost without exception."

Merritt and Fremont-Smith[7] have considered the cerebrospinal fluid under cerebral arteriosclerosis and state that the fluid is usually normal "unless there is some complication, such as cerebral thrombosis or hemorrhage, uremia or congestive heart failure" and give results of average spinal fluid protein 40 mgm. per 100 cc. and sugar, average of 70 mgm. per 100 cc. Their normal protein values are given as between 15-45 mgm. per 100 cc. (Denis-Ayer method) and noted a composite recording of sugar 45-85 mgm. per 100 cc. throughout the literature.

In making a study of the spinal fluid protein and sugar (dextrose) content of patients admitted to this clinic and diagnosed cerebral arteriosclerosis and senile dementia, we have reviewed 371 cases. Of this number 236 were diagnosed as cerebral arteriosclerosis and 135 as senile dementia. We wish to report the following results:

In the clinic the following differential points indicated cerebral arteriosclerosis:

1) History of headache, dullness, pressure on the head, hyperasthesia, more severe headaches in the morning, vertigo from mild type to definite vestibular disturbance, feeling of rotating or falling.

2) Evidence of physical arteriosclerotic changes.

3) Retinal changes, silver wire appearance.

4) Visual phenomena, such as central scotoma.

5) Transient confusion states followed by periods of alertness and normality.

6) Focal memory defects in contrast to diffuse defects in senile dementia.

7) Early fifties and early sixties for age grouping.

There was no special time at which these punctures were made and hence the values found should represent average, especially in case of the sugar (dextrose), content.

We present the above results, as outlined, for consideration.

Conclusions

1) That the spinal fluid protein and sugar (dextrose) content in cerebral arteriosclerosis and senile dementia is within normal limits.

2) That this content is practically the same in each case, within reasonable limits of error.

3) That this is not a differential diagnostic point.

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Diagnosis	*Average Age (369 cases)*	*Average Spinal Fluid Protein Mgm/100 cc.*	*Average Spinal Fluid Sugar Mgm/100 cc.*
Cerebral arteriosclerosis	61.6 yrs.	39.934	71.139
Senile dementia	70.3	40.762	72.629

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Neurological Clinical Pathological Conference

of the

Cincinnati General Hospital

CHARLES D. ARING, M.D., *Editor*

CASE 430633

Presentation of Case

A 47-year-old white woman was admitted to the hospital on June 13. One month previously she had suddenly become blind while washing walls at her home. After that episode the vision gradually improved, though she suffered from diplopia; the vision returned more in the right eye than in the left. She noted that her fields of vision were restricted, for she had to turn her head in various directions to see things, which formerly would have been seen readily on looking straight ahead. Roughly coincident with the visual disturbance she suffered the onset of intermittent headaches, particularly present at night. They were located mostly in the vertex. Activity in the upright position seemed to accentuate the headache. Beginning about the same time there occurred a puffing noise within the head, which she described as resembling the puff of a railroad engine. The noise was constant, of uniform intensity, and was not localized.

About a week after the onset of the visual disturbance she began to have difficulty in walking; she complained particularly of staggering.

With the present illness there had been anorexia and occasional vomiting, both of which had become more pronounced with the passing of time. She noted a loss of about 15 to 20 pounds in weight over the past four or five months. Within two or three weeks prior to hospital admission there had been noted some drooping of the lids, more marked on the left. She had become increasingly drowsy and weak. Up to the time of admission to the hospital she could be aroused from her lethargy and though her reaction at times was slow, she would seem to relate a clear story with prodding.

She was the mother of seven children, the youngest 13 years of age. There had been considerable urinary disturbance over a period of years. At one time she stated she had treatments for a bladder disorder as long as 18 years ago. In the last year she had suffered from burning and frequent urination, and occasionally incontinence. Nocturia occurred two to three times and enuresis was not uncommon. She stated she had pus and occasionally blood in her urine for about one year.

Examination and Course—The patient was lethargic and not too cooperative. She would respond to repeated questioning and was found to be oriented in the initial examination. The left pupil was larger than the right, and they reacted sluggishly to light. There was bilateral ptosis, more marked on the left. The right optic disc was slightly pale, the left disc was paler than the right. The retinal vessels were normal. She recognized colors and objects, and though the fields were thought to be restricted it was believed that there was no homonymous hemianopia. She was unable to move the eyes upward. The left eye could not be moved inward and could be moved outward only fairly well. There was spontaneous nystagmus accentuated on looking to the right. There was mild generalized weakness with the lethargy which made voluntary movement rather deliberate, and sometimes inaccurate. The abdominal reflexes were not obtained; neither were the ankle jerks obtained in bed. The plantar responses were bilaterally extensor.

The hospital course was marked by rather persistent nausea and vomiting, and she was

usually involuntary of urine. She was confused at times, and occasionally would talk to herself or would get out of bed. On June 17 it was first noted that her speech was slow and slurred, and difficult to understand. On June 19 it was noted that the only movement of the eyes was that supplied by the inferior oblique muscles. On June 21 a ventriculogram was done, which revealed no abnormalities. Dyspnea was noted on June 22 and hyperpnea on June 23. On June 23 when the patient seemed to be more alert than previously, severe tremor (possibly convulsion) was noted by a nurse in the upper extremities. About twelve hours before death, the patient had a severe generalized convulsion lasting three minutes. She died on June 24 on the twelfth hospital day.

Laboratory Data — The temperature was maintained at normal throughout the hospital stay, with the exception of an occasional rise to 100° F. rectally. The pulse usually ranged between 100 and 110 per minute, and during the final two days was maintained at about 120. The respirations rose from normal to 30 two days before death, and terminally to 40 per minute. The blood pressure which had been normal rose gradually after the ventriculogram until it reached a high level of 190/128 two days after operation; two hours later the blood pressure again reached a normal level, and prior to the final convulsive episode ranged between 110/60 and 170/110. Immediately after the convulsion, it was 80/50, and thenceforth descended slightly and gradually to 60/30. Five urinalyses were done, the specific gravity ranging between 1.008 and 1.020; all specimens contained considerable amounts of albumin. The highest level reached was 160 mg., the urine contained no sugar, but did contain many white cells and a fair number of red cells. Benzidine tests for blood were reported as 3 and 4 plus. A red blood count was 3,200,000 on June 14; 3,700,000 on June 20. The hemoglobin determinations were 9.1 grams and 10.2 grams respectively. The highest white blood count was 12,700 on June 20 with normal differential count. On June 23 the non-protein nitrogen of the blood was 121.5 mg. per cent. The CO_2 combining power was 6 volumes per cent. The blood Kahn determinations on June 15 and June 23 were negative. Roentgen plates of the skull and chest revealed no abnormalities.

Three lumbar punctures were done.

Date	*Initial Pressure*	*Color*	*Lymphocytes*	*R.B.C.*	*Protein*	*Chloride*	*Sugar*
6/14/43	120 mm.	Water	7	9	67 mg.%	786 mg.%	90
6/17/43	150 mm.	Water	10	25			
6/23/43	170 mm.	Water	No fluid was removed				

The gold curves and Wassermanns were negative.

Differential Diagnosis

Dr. Howard D. McIntyre: Since I am unable to make a diagnosis in this case I will be satisfied if I mention the correct condition during the course of the discussion. If the initial neurological complaint of the onset of blindness in May indicates an amblyopic bitemporal hemianopsia, it would suggest that there may have been an aneurysm of the circle of Willis. The pallor of the discs might be compatible with aneurysm as may also the headaches. The puffing noise in her head might indicate pulsation, which would also suggest aneurysm although hemangioma would require consideration. The clear colorless CSF would mitigate against the diagnosis of aneurysm. However, the blindness occurred a month before the patient was tapped; the fluid had had time to clear.

The drowsiness from which the patient could be aroused easily associated with relative mental clarity were signs commonly observed in the Economo type of encephalitis. The normal temperature would tend to exclude Economo's encephalitis, although this combination was found occasionally during the epidemic.

The localization of the lesion in this case was high in the brain stem, since there were ptosis, pupillary abnormality, gradual weakness of eye movements, nystagmus, and bilateral pyramidal tract signs. The fluctuating blood pressure after air encephalography might point to the hypothalamus.

The urinary incontinence of long duration might suggest cord or brain involvement. The symptoms of hematuria and painful urination indicate pyelitis or cystitis. Uremia occurred as a terminal event. Whether the nervous signs were those associated with uremia re-

mains to be seen; cerebral manifestations are not an uncommon concomitant of uremia. The convulsions might have been on this basis.

The negative CSF Wassermann and gold curve would appear to exclude syphilis as a factor. Cases of meningovascular lues with negative CSF Wassermann and gold curve do occur, but are usually accompanied by a positive blood Wassermann. The low grade lymphocytosis would suggest lues or encephalitis. The red blood cells in the fluid could be due to the needle puncture. The CSF chloride and sugar in this case would assuredly appear to exclude tuberculosis, but not necessarily tuberculoma of the brain stem. The CSF sugar is elevated a bit, a concomitant blood sugar determination was not done.

The normal encephalogram would exclude most space-consuming lesions, possibly it would not exclude aneurysm or a small tumor at the base.

The diagnostic possibilities appear to be aneurysm, the cerebral manifestations of uremia, Economo's encephalitis; though I think I prefer glioma of the brain stem, if I am to be pushed to the expression of a final opinion.

Dr. Milton Rosenbaum: It seems to me that the question arises whether we are dealing with one or two diseases? Does she have kidney and bladder disease that has nothing to do with cerebral signs? She had uremia which was the cause of death. One can localize the central nervous system disease pretty well to the midbrain and hypothalamus. It is difficult to understand the findings in the optic discs. If the discs were pale, it would indicate that the disease was going on for some time. I would be inclined to consider the diagnoses of acute multiple sclerosis and neoplasm in the genito-urinary tract.

Clinical Diagnosis

Pyelonephritis.
Uremia with cerebral manifestations.

Dr. McIntyre's Diagnosis

Glioma of the brain stem.

Anatomical Diagnosis

Lethargic encephalitis (Economo).
Pyelonephritis.
Toxic changes in the viscera.

Discussion of Pathology

Dr. I. Mark Scheinker: On gross examination of the brain there were no changes except for slight congestion in the midbrain about the aqueduct. In the microscopic examination of sections of the rostral pons, midbrain, and hypothalamus the outstanding changes were those of a diffuse inflammatory process. Many capillaries were surrounded by dense cuffs of lymphocytes. The nerve cells disclosed neuronophagia with partial or complete destruction. In addition there were diffusely scattered small nodules, composed of glial cells. These nodules were associated with inflammatory changes. The perivascular cuffing was also to be seen around some of the larger vessels. In the sections of the substantia nigra the inflammatory process was especially marked; many newly formed capillaries were found. The pathologic process could be classified best as acute and inflammatory, associated with the formation of glial nodules and neuronophagia. There was a slight increase of microglia.

Extensive study of the central visual system was made in an attempt to elucidate the sudden blindness. The optic chiasm showed no change. The optic radiation was followed, and in sections taken from the inferior portion of the right occipital lobe, there was an area of acute inflammation, associated with a circumscribed area of hemorrhage. This lesion, which was microscopically similar to that in the midbrain, transected the optic radiation. In sections taken from the geniculate bodies there were diffuse inflammatory changes associated with partial destruction of the nerve cells.

Sections from the cerebral cortex were normal.

Since acute multiple sclerosis might be considered in the differential diagnosis extensive studies of the myelin sheaths and axis cylinders throughout the nervous system (cerebrum, brain stem, and spinal cord) were conducted. These showed the inflammatory changes in the diencephalon. There was slight pallor of the tissue around the affected vessels, but no plaque formation.

The examination of the viscera disclosed changes typical of pyelonephritis. Small hemorrhages were found in the adrenal glands.

In summary we are dealing with an in-

flammatory process associated with quite marked glial reaction, confined to the region about the third ventricle and aqueduct. As you have seen (lantern slides), few changes were found in the rest of the brain. I think that there is no doubt about the inflammatory nature of the disease, and you will probably agree with me that we are dealing with encephalitis of a particular type.

The purulent or suppurative type of encephalitis can be ruled out easily. The accurate diagnosis of the other types of encephalitis is quite difficult from a purely morphologic point of view. Because of the presence in this case of the two main characteristics of Economo's encephalitis; the changes were confined to the region about the third ventricle, the peri-aqueductal area and substantia nigra, and were associated with formation of glial nodules, we felt justified in making the diagnosis of encephalitis lethargica (Economo).

Dr. McIntyre: I think that the histopathology in this case supports the diagnosis of Economo's encephalitis. I was practicing during the period of the epidemic of lethargic encephalitis. I am certain if this case had been seen during the epidemic, the correct diagnosis would have been made. The clinical course is typical. Now we practically never make this diagnosis. I have seen sporadic cases of Economo's encephalitis proved at autopsy in 1933 and 1941. Perhaps the etiologic agent is latent in this community. If the correct diagnosis had been suspected in this case, virus studies would have been done. It remains to be proven that lethargic encephalitis is of virus origin.

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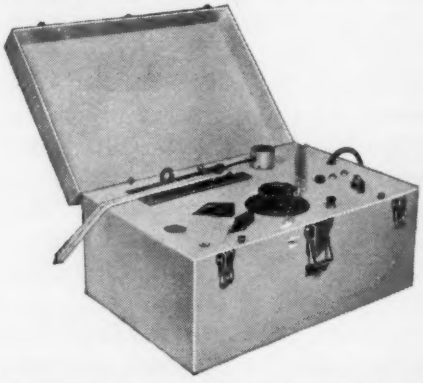

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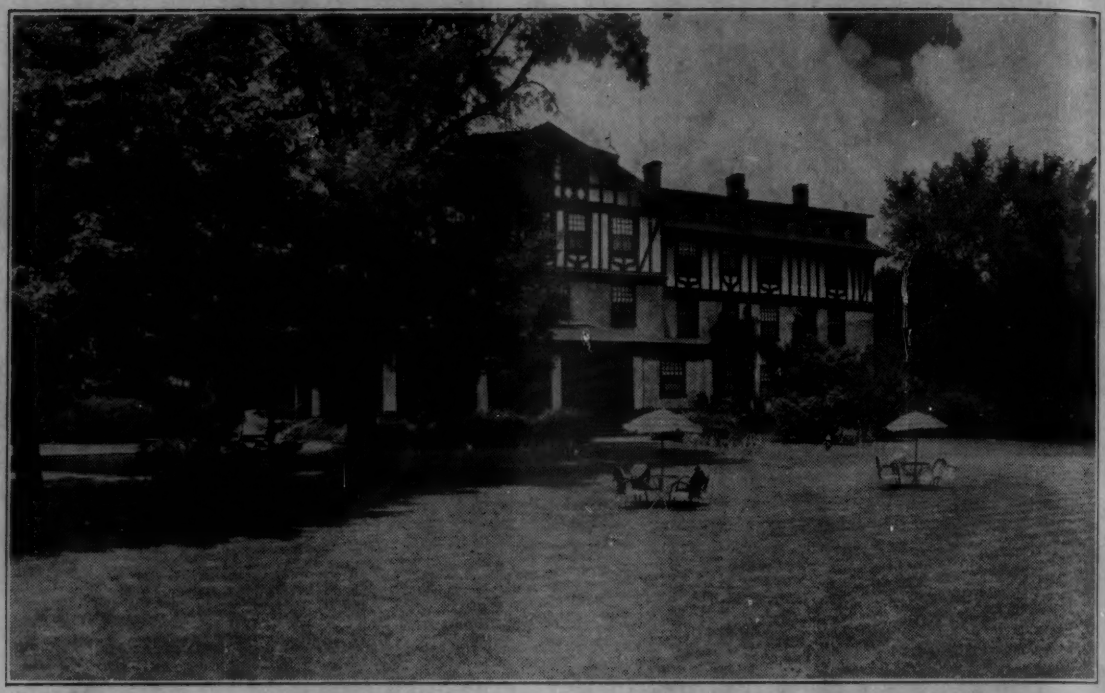

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